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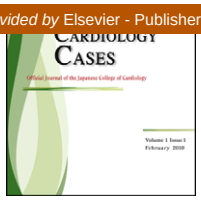

Case report

Stanford type B aortic dissection associated with pregnancy in patients with Marfan syndrome—A case report and review of the literature

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KEYWORDS
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Summary A 36-year-old female patient known to have Marfan syndrome (MFS) presented with Stanford type B aortic dissection (type B-AD) 3 days after delivery although she had taken oral β-blocker and underwent prophylactic cesarean section at 34 weeks when she showed 42 mm of the ascending aorta. She was successfully treated medically without further progression of the dissection. A review of the literature revealed an additional 19 patients with MFS who suffered from type B-AD associated with pregnancy. Of 20 patients, 1 (5%) died but the remaining 19 patients were successfully treated either medically ($n = 9$) or surgically ($n = 10$). Of 13 patients whose aortic diameter was known, 5 showed <40 mm of the ascending aorta. Pregnancy in MFS can be complicated by type B-AD with a peak around term delivery irrespective of the size of ascending aorta and even with β-blocker.

Introduction

Pregnancy itself has been associated with an increased risk of aortic dissection [1] because of increasing cardiac output as well as blood volume or hormonal changes that could directly weaken the aortic wall [2]. Therefore pregnancy in female patients with Marfan syndrome (MFS) may carry a higher risk of aortic dissection [3]. In general, these aortic dissections occur predominantly at the ascending aorta and only rarely at the descending aorta. Therefore a guideline for management of pregnancy and delivery in patients with MFS was developed according to the size of the ascending aorta [4–6]. We describe a patient with MFS who suffered from the Stanford type B aortic dissection (type B-AD) 3 days after delivery and conducted a review of the literature

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Table 1 Reported type B aortic dissection associated with pregnancy in patients with Marfan syndrome.

Timing of Ao dissection (Weeks)	# of patients	Known MFS	Maternal age (years)	# of pregnancies median (range)	Pre-Ao size >40 mm	Beta blocker	Tx of Ao dissection	Maternal mortality	Fetal or neonatal mortality
<GA 34 [3,8—13]	7	7/7	30.2 ± 3.7	1 (1—6)	4/6	1/6	Medical 5/Surgical 2	1/7	3/7
GA 34—40 [1,14—18]	6	5/5	29.3 ± 1.5	1.5 (1—3)	1/2	1/5	Medical 2/Surgical 4	0/6	1/6
Delivery — PDW 2 [19—22]	7	6/7	33.6 ± 4.2	1 (1—6)	3/5	2/5	Medical 2/Surgical 5	0/7	0/4

Ao, aortic; GA, gestational age; MFS, Marfan syndrome; PDW, post-delivery weeks, Pre-Ao size, the diameter of the ascending aorta before dissection; Tx, treatment; #, number.

to characterize patients' demographics and management, and maternal and fetal prognosis in patients with MFS who suffered from type B-AD associated with pregnancy.

Case report

A 36-year-old female patient, who was known to have MFS and had been placed on oral atenolol, presented with acute back pain 3 days after prophylactic cesarean section.

At 10 years of age when she suffered from decreased visual acuity because of lens dislocation, she visited us and was diagnosed as having MFS based on Ghent criteria [7]. At 32 years of age when she was confirmed to have fibrillin-1 mutation, 4538 del C, with measured aortic sinus diameter of 40.7 mm, she started taking 25 mg of atenolol daily, but could not increase the dosage because of fainting. At 35 years of age, she became married and X-ray computed tomography showed annuloaortic ectasia without any aortic aneurysm or dissection. After multi-disciplinary meeting, she expressed strong will to have a child and became pregnant 8 months later.

During pregnancy and after delivery, she continued taking 25 mg of atenolol and visited us and her obstetrician regularly without any problems. At 34 weeks of gestation, her aortic sinus diameter was measured as 42 mm, interpreted as a substantial increase from 40.7 mm by echocardiography, and she was scheduled to have elective cesarean section, according to the Japanese guideline of delivery management [4]. She underwent successful cesarean section under general anesthesia combined with epidural anesthesia for post-delivery pain control. Her blood pressure was controlled around 115—120 mmHg in systole during the delivery.

She resumed taking atenolol next day and had been hemodynamically stable with systolic blood pressure of 106—117 mmHg. Post-delivery day 3, however, she suddenly complained of back pain when her blood pressure was measured as 134/60 mmHg and emergency X-ray computed tomography revealed type B-AD starting at the left subclavian artery and ending at the right common iliac artery. She was transferred to the cardiac care unit and treated medically with continuous infusion of nitroglycerin to control her blood pressure and fortunately did not develop any signs of malperfusion or further dilation of the aorta. Her medication was gradually replaced with combinations of oral anti-hypertensive drugs and X-ray computed tomography on 15 days of illness revealed no progressive dilation of the aorta. She was discharged on 34 days of illness with anti-hypertensive medication and she did not show progression of the disease at her final visit 3 months after the onset of dissection.

A baby girl, without any suspicious signs of MFS, was born with Apgar score of 7 and 8 at 1 and 5 min, respectively. She suffered from transient tachypnea that was successfully treated with nasal positive airway pressure.

Review of the literature

Systematic review of the literature (keywords: Marfan syndrome; descending aortic aneurysm; pregnancy) was conducted via PubMed with careful manual review of the references from relevant articles. We identified 18 relevant articles including a total of an additional 19 patients with MFS whose pregnancy was complicated by type B-AD between 1983 and 2008 (Table 1) [3,8—22].

The mean age at pregnancy was 30.9 ± 3.6 (mean and standard deviation) years with median 1 (1—6) in gravida. The number of patients suffered from type B-AD increased with gestational age with a peak around term delivery (Table 1). Of 20 patients, 1 (5%) patient presented at 17 weeks and died, despite prophylactic aortic root replacement. The remaining 19 patients were successfully treated either medically ($n = 9$) or surgically ($n = 10$). Although 17 patients were known to have MFS, only 4 patients were placed on oral β-blocker. Of 13 patients whose size of ascending aorta was determined during pregnancy, 5 patients (38%) showed <40 mm of the size of ascending aorta.

Discussion

This study indicates that pregnancy with MFS can be complicated by type B-AD with a peak around term delivery irrespective of the size of ascending aorta and even with β-blocker and prophylactic cesarean section and highlights several issues associated with pregnancy with MFS.

The first issue is the timing of type B-AD associated with pregnancy in MFS. We must keep in mind that type B-AD may occur at any time during pregnancy or after delivery. Although the incidence of type B-AD increased with gesta-

tional age as shown in Table 1, we must realize that one third of type B-AD occurred after delivery. In fact, our patient developed type B-AD even after premature cesarean section at 34 weeks. Therefore, we have to prepare for sudden onset of this complication at any time and let all medical personnel know it.

The second issue is to predict this type of B-AD associated with pregnancy. Although several guidelines have been published from different associations, all these guidelines were based on the size of ascending aorta to prevent ascending aortic dissection and there was no guideline to predict type B-AD [4—6]. Substantially the size of the ascending aorta cannot be a predictor of type B-AD. In our patient, we offered prophylactic cesarean section to prevent ascending aortic dissection after we noticed significant dilation of the ascending aorta, but she suffered from type B-AD. Furthermore, about one third (38%) of the patients with type B-AD showed <40 mm of the ascending aorta and were thought to be relatively safe to undergo pregnancy in MFS. On the other hand, we have to emphasize that a patient who underwent prophylactic replacement of ascending aorta does have significant risk of developing type B-AD because the specific patient might have generalized aortic wall disruption and carry a higher risk of developing aortic dissection at any part of the aorta [19]. Because there were few data available concerning the size of descending aorta prior to dissection in this study, it was impossible to determine the specific size of descending aorta to predict dissection associated with pregnancy, although Engelfriet et al. suggested that patients with descending aorta of >20 mm carry a higher risk of descending aortic dissection later on [23].

The third issue is treatment to prevent vascular wall disruption resulting in aortic dissection in MFS. Since both angiotensin-converting enzyme inhibitors and angiotensin receptor blockers are known to be teratogenic, theoretically these drugs cannot be used. Although β-blocker is the recommended medication during pregnancy with MFS, only 4 of 16 patients had been placed on β-blocker during pregnancy and it is impossible to determine the effectiveness of β-blockers in this study. In addition, prophylactic preterm termination of pregnancy may not prevent descending aortic dissection. In fact, we terminated pregnancy at 34 weeks, the earliest gestational age when usually a baby can survive without significant respiratory problems, but the patient developed aortic dissection. On the other hand, it must be determined if strict control of blood pressure with any medication during pregnancy and after delivery may prevent descending aortic dissection.

Considering these unsolved issues, the only substantial way to prevent type B-AD associated with pregnancy in MFS might be to identify patients with MFS as early in life as we can and place them on therapy to prevent aortic wall disruption [24,25].

Conclusions

This case report and literature review revealed that pregnancy in patients with MFS has a significant risk of aortic dissection not only at the ascending aorta but also at the descending aorta even when treated with β-blocker. We have to accumulate more data to identify any predictor of this descending aortic dissection associated with pregnancy. Or, ultimately we have to find a way to prevent the remodeling of the aortic wall and to minimize aortic dilation in patients with MFS.

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